






LITEMAX SLO2325-E

Sunlight Readable 23" LED B/L LCD

User Manual

(1st Edition 26/Sep/2014)

All information is subject to change without notice.

Approved by	Checked by	Prepared by
		

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RECORD OF REVISION

Version and Date	Page	Old Description	New Description	Remark
26,Sep,2014	all		Initial Release	

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1.0 GENERAL DESCRIPTION

SLO2325-E is 23" wide color TFT-LCD module as active switching devices with 1,000nits LED backlight powered by Durapixel™ technology. This module has a 23 inch diagonally measured active area with Full HD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.

FEATURES

- Sunlight Readable
- LED Backlight
- High Shock & Vibration Resistance
- Low Power Consumption
- High Uniformity
- Low EMI Noise
- Wide Viewing Angle
- Life Expectancy

Applications

- Gaming
- Kiosk
- POS

GENERAL SPECIFICATIONS

Model No.	SLO2325-E
Description	23" Wide TFT LCD, LED Backlight 1000 nits, FHD
Display Area (mm)	509.18 (H) x 286.41(V)
Brightness	1,000 cd/m ²
Resolution	1920 x 1080 (FHD)
Contrast Ratio	1000 : 1
Pixel Pitch (mm)	0.2652(H) x 0.2652(V)
Viewing Angle	178°(H), 178°(V)
Display Colors	16.7M colors
Response Time (Typical)	14 ms
Sync	LVDS
Power Consumption	42W
Dimensions (mm)	570.4 x 314.2 x 35.9 mm
Weight (Net)	4.2Kg

SLO= Panel + LED Driving Board + Control Board + Housing

ABSOLUTE MAXIMUM RATINGS

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

ABSOLUTE RATINGS OF ENVIRONMENT

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	V _{LCD}	-0.3	6.0	Vdc	at 25 ± 2°C
Operating Temperature	T _{OP}	0	50	°C	1, 2, 3
Storage Temperature	T _{ST}	-20	60	°C	
Operating Ambient Humidity	H _{OP}	10	90	%RH	
Storage Humidity	H _{ST}	10	90	%RH	
LCM Surface Temperature (Operation)	T _{Surface}	0	65	°C	1, 4

Note : 1. Temperature and relative humidity range are shown in the figure below.

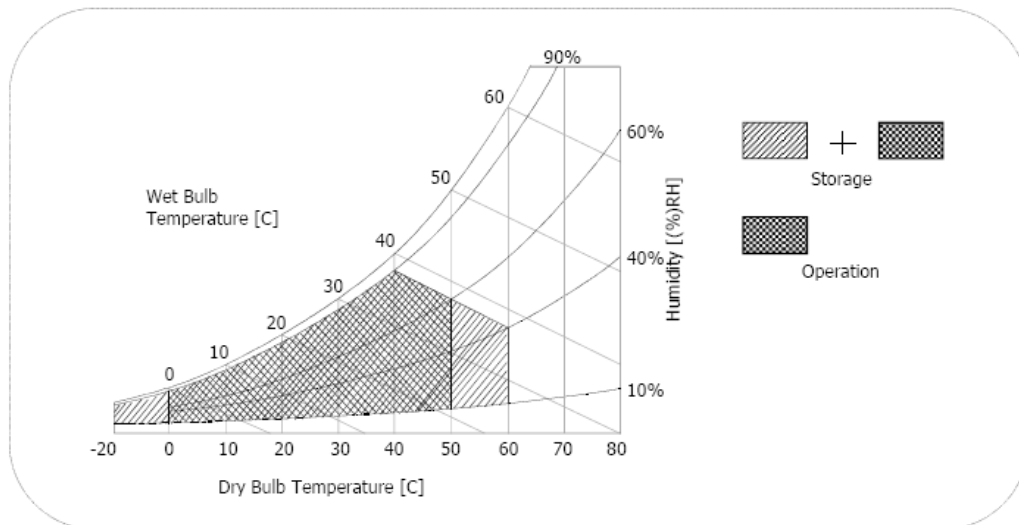
Wet bulb temperature should be 39 °C Max, and no condensation of water.

2. Maximum Storage Humidity is up to 40°C, 70% RH only for 4 corner light leakage Mura.

3. Storage condition is guaranteed under packing condition

4. LCM Surface Temperature should be Min. 0°C and Max. 65°C under the VLCD=5.0V, fV=60Hz, 25°C ambient Temp. no humidity control and LED string current is typical value.

FIG.2 Temperature and relative humidity



2.0 Electrical characteristics

TFT LCD Module Power Specification

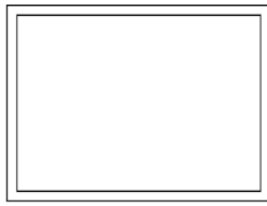
Input power specifications are as following:

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
MODULE :						
Power Supply Input Voltage	V _{LCD}	4.5	5	5.5	V _{dc}	
Permissive Power Input Ripple	V _{dRF}			100	mV _{p-p}	1
Power Supply Input Current	I _{LCD}	-	(790)	(990)	mA	2
		-	(960)	(1200)	mA	3
Power Consumption	P _c TYP	-	(4.0)	(5.0)	Watt	2
	P _c MAX	-	(4.8)	(6.0)	Watt	3
Rush current	I _{RUSH}	-	-	3.0	A	4

Note :

1. Permissive power ripple should be measured under V_{LCD} =5.0V, 25°C, fV(frame frequency)=MAX condition and At that time, we recommend the bandwidth configuration of oscilloscope is to be under 20Mhz. See the next page.
2. The specified current and power consumption are under the V_{LCD}=5.0V, 25± 2°C,fV=60Hz condition whereas Typical Power Pattern [Mosaic] shown in the [Figure 3] is displayed.
3. The current is specified at the maximum current pattern.
4. Maximum Condition of Inrush current :
The duration of rush current is about 5ms and rising time of power Input is 500us ± 20%.(min.).

- **Permissive Power input ripple** ($V_{LCD} = 5.0V$, $25^{\circ}C$, f_v (frame frequency)=MAX condition)

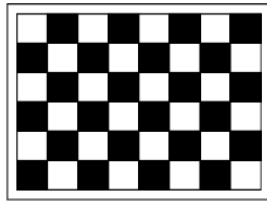


White pattern



Black pattern

- **Power consumption** ($V_{LCD} = 5V$, $25^{\circ}C$, f_v (frame frequency)=60Hz condition)



Typical power Pattern



Maximum power Pattern

FIG.3 Mosaic pattern & White Pattern for power consumption measurement

Interface Connections

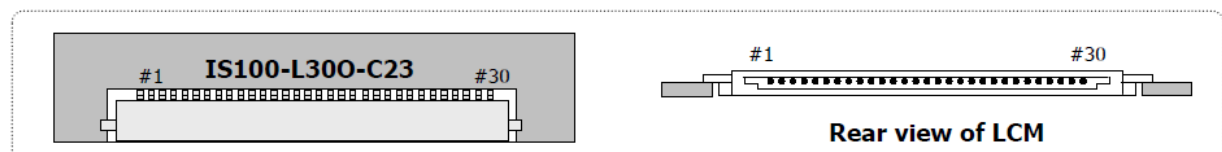
LCD Module

- LCD Connector(CN1) : IS100-L300-C23 (UJU) , GT103-30S-HF15 (LSM)
- Mating Connector : FI-X30C2L (Manufactured by JAE) or Equivalent

Table 3. MODULE CONNECTOR(CN1) PIN CONFIGURATION

No	Symbol	Description	No	Symbol	Symbol
1	FR0M	Minus signal of odd channel 0 (LVDS)	16	SR1P	Plus signal of even channel 1 (LVDS)
2	FR0P	Plus signal of odd channel 0 (LVDS)	17	GND	Ground
3	FR1M	Minus signal of odd channel 1 (LVDS)	18	SR2M	Minus signal of even channel 2 (LVDS)
4	FR1P	Plus signal of odd channel 1 (LVDS)	19	SR2P	Plus signal of even channel 2 (LVDS)
5	FR2M	Minus signal of odd channel 2 (LVDS)	20	SCLKINM	Minus signal of even clock channel (LVDS)
6	FR2P	Plus signal of odd channel 2 (LVDS)	21	SCLKINP	Plus signal of even clock channel (LVDS)
7	GND	Ground	22	SR3M	Minus signal of even channel 3 (LVDS)
8	FCLKINM	Minus signal of odd clock channel (LVDS)	23	SR3P	Plus signal of even channel 3 (LVDS)
9	FCLKINP	Plus signal of odd clock channel (LVDS)	24	GND	Ground
10	FR3M	Minus signal of odd channel 3 (LVDS)	25	NC	No Connection (I2C Serial interface for LCM)
11	FR3P	Plus signal of odd channel 3 (LVDS)	26	NC	No Connection.(I2C Serial interface for LCM)
12	SR0M	Minus signal of even channel 0 (LVDS)	27	ITLC	Interlace Mode Selection
13	SR0P	Plus signal of even channel 0 (LVDS)	28	V _{LCD}	Power Supply +5.0V
14	GND	Ground	29	V _{LCD}	Power Supply +5.0V
15	SR1M	Minus signal of even channel 1 (LVDS)	30	V _{LCD}	Power Supply +5.0V

- Note: 1. All GND(ground) pins should be connected together and to Vss which should also be connected to the LCD's metal frame.
2. All V_{LCD} (power input) pins should be connected together.
3. Input Level of LVDS signal is based on the IEA 664 Standard.
4. ITLC is Interlace mode selection pin. (L : Normal Mode, H : Interlace Mode)
If you don't use this pin, it should be connected to GND.



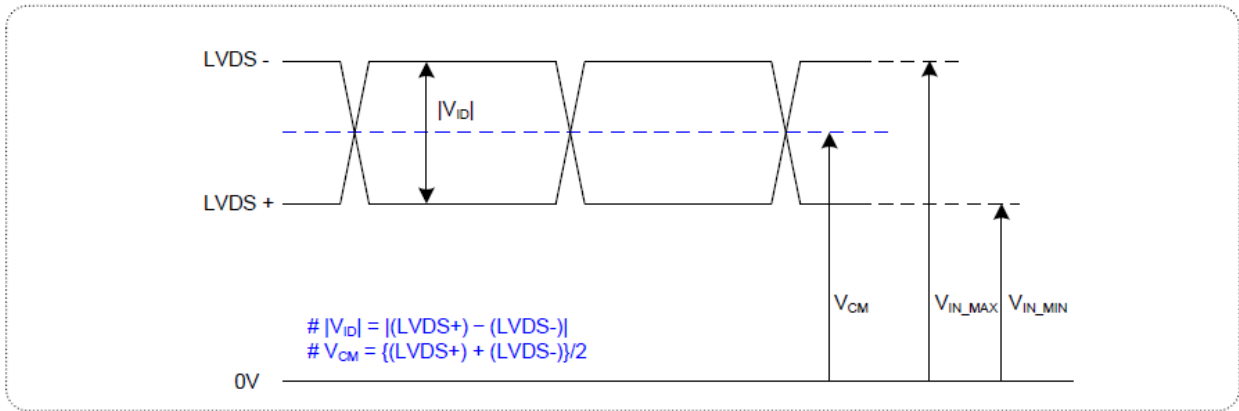
REQUIRED SIGNAL ASSIGNMENT FOR Flat Link (TI:SN75LVDS83) Transmitter

Pin #	Pin Name	Require Signal	Pin #	Pin Name	Require Signal
1	Vcc	Power Supply for TTL Input	29	GND	Ground pin for TTL
2	D5	TTL Input (R7)	30	D26	TTL Input (DE)
3	D6	TTL Input (R5)	31	T _x CLKIN	TTL Level clock Input
4	D7	TTL Input (G0)	32	PWR DWN	Power Down Input
5	GND	Ground pin for TTL	33	PLL GND	Ground pin for PLL
6	D8	TTL Input (G1)	34	PLL Vcc	Power Supply for PLL
7	D9	TTL Input (G2)	35	PLL GND	Ground pin for PLL
8	D10	TTL Input (G6)	36	LVDS GND	Ground pin for LVDS
9	Vcc	Power Supply for TTL Input	37	T _x OUT3 +	Positive LVDS differential data output 3
10	D11	TTL Input (G7)	38	T _x OUT3 –	Negative LVDS differential data output 3
11	D12	TTL Input (G3)	39	T _x CLKOUT +	Positive LVDS differential clock output
12	D13	TTL Input (G4)	40	T _x CLKOUT –	Negative LVDS differential clock output
13	GND	Ground pin for TTL	41	T _x OUT2 +	Positive LVDS differential data output 2
14	D14	TTL Input (G5)	42	T _x OUT2 –	Negative LVDS differential data output 2
15	D15	TTL Input (B0)	43	LVDS GND	Ground pin for LVDS
16	D16	TTL Input (B6)	44	LVDS Vcc	Power Supply for LVDS
17	Vcc	Power Supply for TTL Input	45	T _x OUT1 +	Positive LVDS differential data output 1
18	D17	TTL Input (B7)	46	T _x OUT1 –	Negative LVDS differential data output 1
19	D18	TTL Input (B1)	47	T _x OUT0 +	Positive LVDS differential data output 0
20	D19	TTL Input (B2)	48	T _x OUT0 –	Negative LVDS differential data output 0
21	GND	Ground pin for TTL Input	49	LVDS GND	Ground pin for LVDS
22	D20	TTL Input (B3)	50	D27	TTL Input (R6)
23	D21	TTL Input (B4)	51	D0	TTL Input (R0)
24	D22	TTL Input (B5)	52	D1	TTL Input (R1)
25	D23	TTL Input (RSVD)	53	GND	Ground pin for TTL
26	Vcc	Power Supply for TTL Input	54	D2	TTL Input (R2)
27	D24	TTL Input (HSYNC)	55	D3	TTL Input (R3)
28	D25	TTL Input (VSYNC)	56	D4	TTL Input (R4)

Notes : 1. Refer to LVDS Transmitter Data Sheet for detail descriptions.
2. 7 means MSB and 0 means LSB at R,G,B pixel data

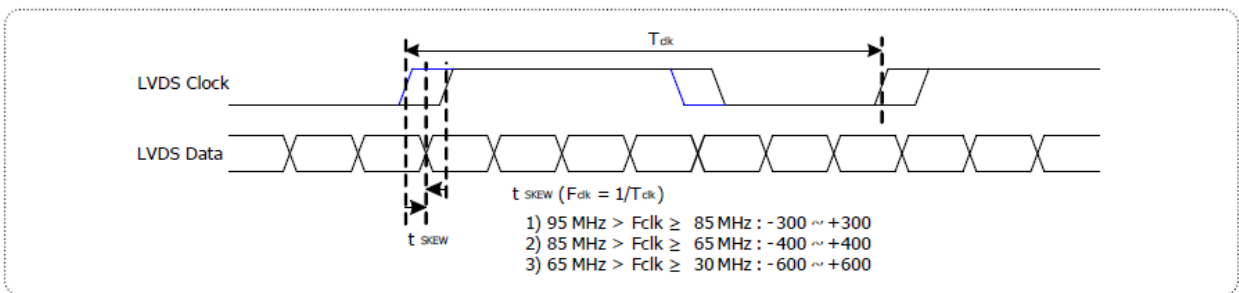
LVDS Input characteristics

1. DC Specification

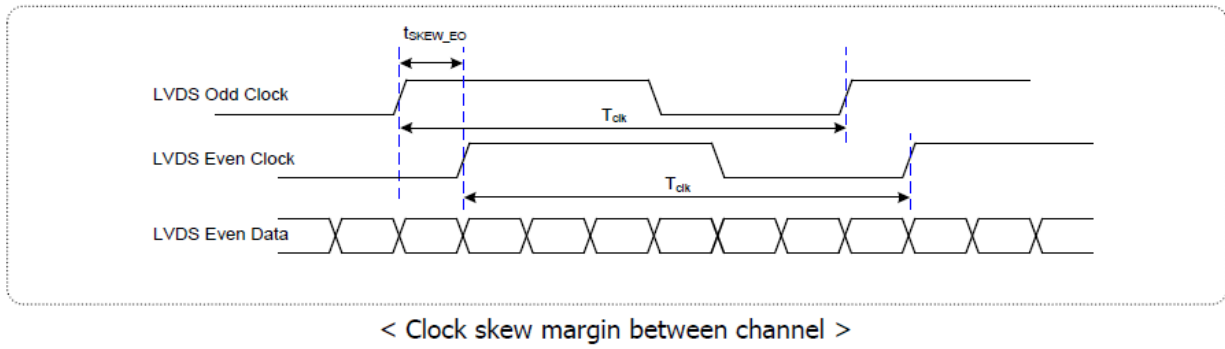


Description	Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	$ V_{ID} $	200	600	mV	-
LVDS Common mode Voltage	V_{CM}	1.0	1.5	V	-
LVDS Input Voltage Range	V_{IN}	0.7	1.8	V	-
Change in common mode Voltage	ΔV_{CM}	-	250	mV	-

2. AC Specification

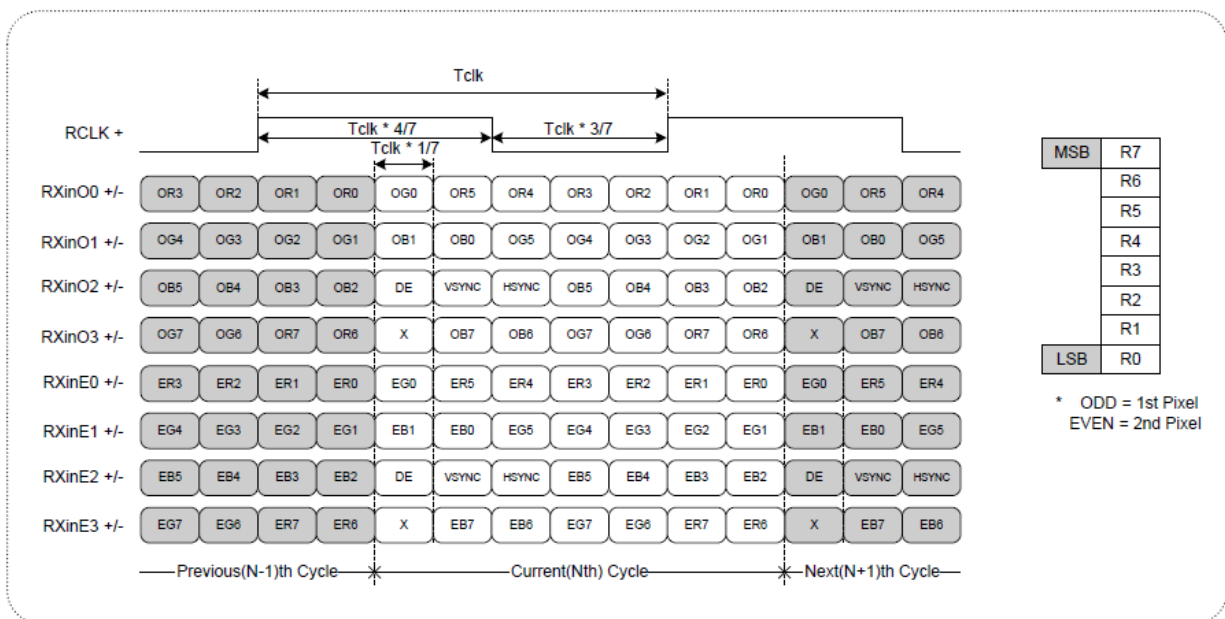


Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}	- 300	+ 300	ps	95MHz > Fclk ≥ 85MHz
	t_{SKEW}	- 400	+ 400	ps	85MHz > Fclk ≥ 65MHz
	t_{SKEW}	- 600	+ 600	ps	65MHz > Fclk ≥ 30MHz
LVDS Clock to Clock Skew Margin (Even to Odd)	t_{SKEW_EO}	- 1/7	+ 1/7	T_{clk}	-



3. Data Format

1) LVDS 2 Port



Signal Timing Specifications

This is signal timing required at the input of the TMDS transmitter. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

TIMING TABLE

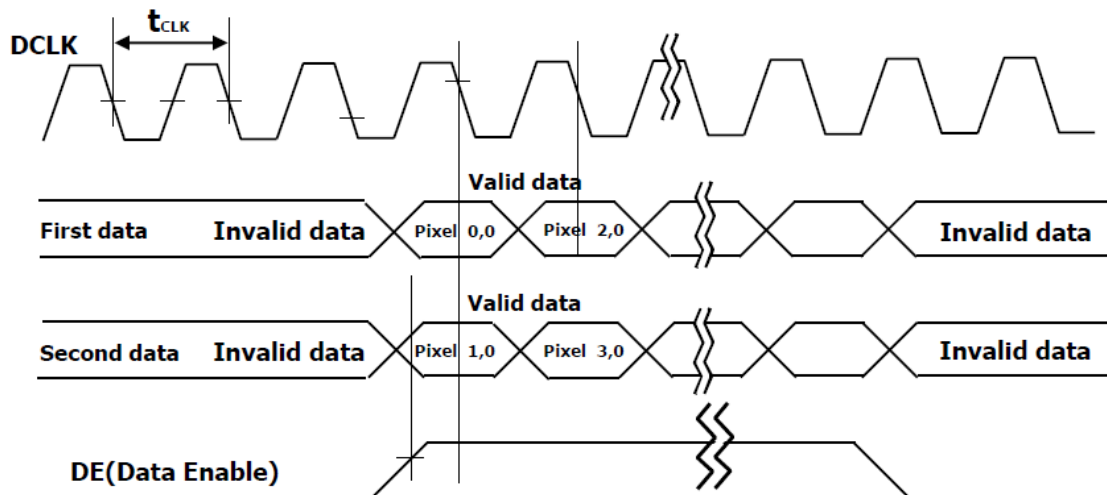
ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	tCLK	11.43	13.89	16.7	ns	
	Frequency	-	60	72	87.5	MHz	5
Hsync	Period	tHP	1024	1088	1120	tCLK	
	Horizontal Valid	tHV	960	960	960	tCLK	
	Horizontal Blank	tHB	64	128	160		
	Frequency	fH	64	66	83	KHz	
	Width	tWH	16	32	48	tCLK	
	Horizontal Back Porch	tHBP	32	48	64		
	Horizontal Front Porch	tHFP	16	48	48		
Vsync	Period	tVP	1090	1100	1160	tHP	
	Vertical Valid	tVV	1080	1080	1080	tHP	
	Vertical Blank	tVB	10	20	80	tHP	
	Frequency	fV	50	60	75	Hz	
	Width	tWV	2	4	16	tHP	
	Vertical Back Porch	tVBP	5	8	32		
	Vertical Front Porch	tVFP	3	8	32		

Note: Hsync period and Hsync width-active should be even number times of tCLK. If the value is odd number times of tCLK, display control signal can be asynchronous. In order to operate this LCM a Hsync, Vsyn, and DE(data enable) signals should be used.

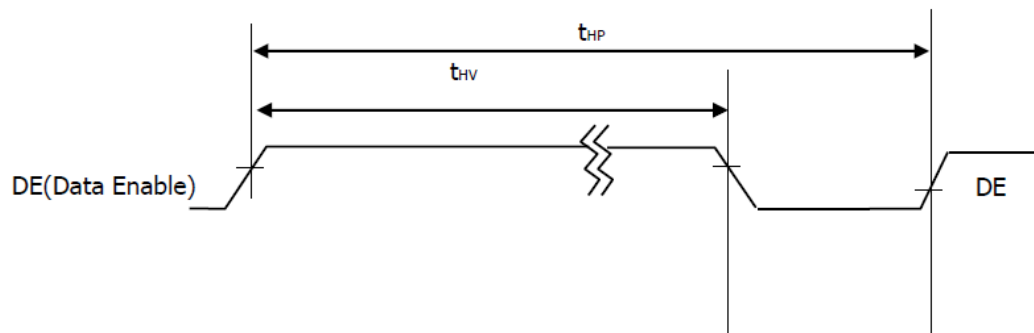
1. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.
2. Vsync and Hsync should be keep the above specification.
3. Hsync Period, Hsync Width, and Horizontal Back Porch should be any times of of character number(4).
4. The polarity of Hsync, Vsync is not restricted.
5. The Max frequency of 1920X1080 resolution is 82.5Mhz

Signal Timing Waveforms

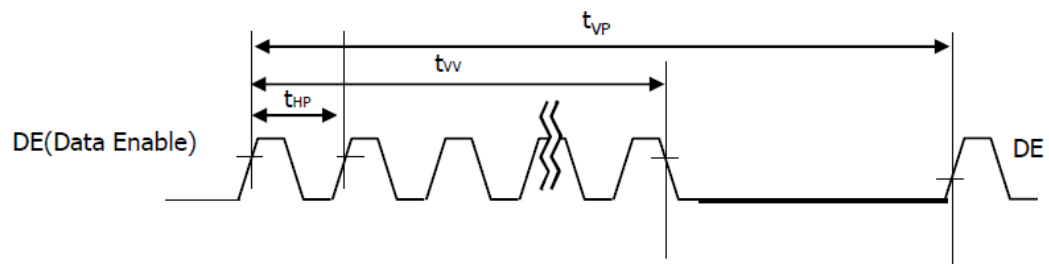
1. DCLK, DE, DATA waveforms



2. Horizontal waveform



3. Vertical waveform



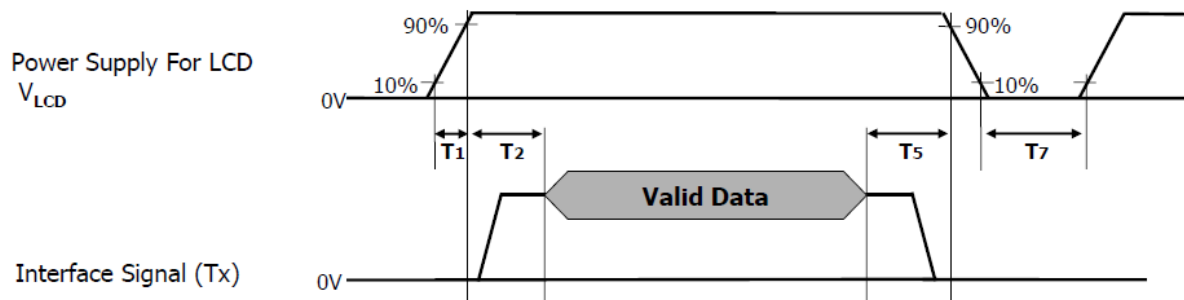
Color Input Data Reference

The Brightness of each primary color(red,green,blue) is based on the 8-bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

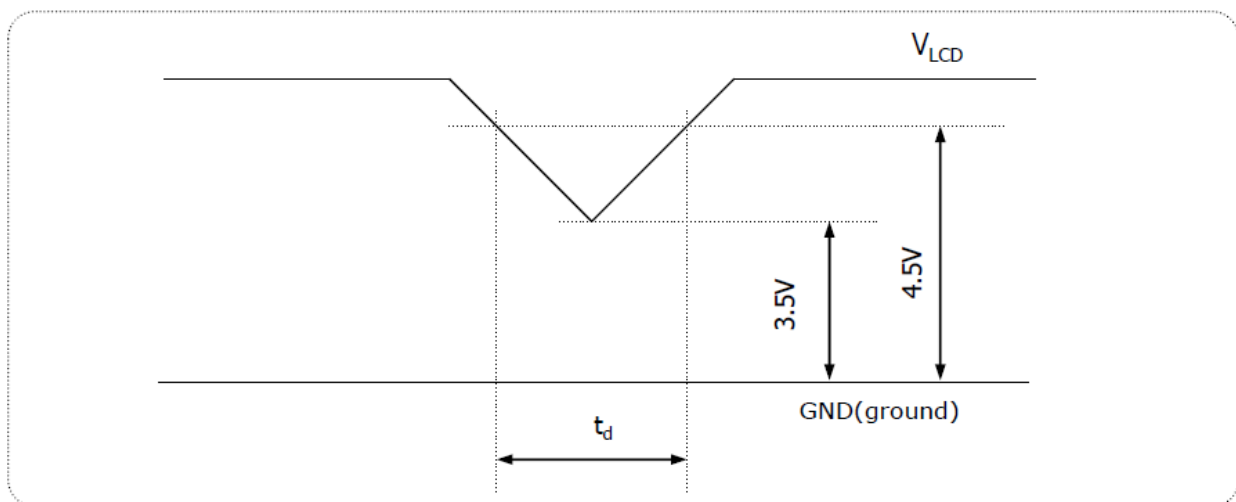
COLOR DATA REFERENCE

Color		Input Color Data																								
		RED								GREEN								BLUE								
		MSB				LSB				MSB				LSB				MSB				LSB				
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
RED	RED (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED (001)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
								
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
GREEN	GREEN (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
								
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
BLUE	BLUE (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
								
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

Power Sequence



VLCD Power Dip Condition



1) Dip condition

$$3.5V \leq V_{LCD} < 4.5V, \quad t_d \leq 20ms$$

2) $V_{LCD} < 3.5V$

V_{LCD} -dip conditions should also follow the Power On/Off conditions for supply voltage.

LED Driving Board

(Operating Characteristics)

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		10.0	12.0	14.0	V	
Input Current (Low Brightness)	IinL	VIN=12V,Vadj=5V	0.0	-----	-----	mA	
Input Current (High Brightness)	IinH	VIN=12V,Vadj=0V	3.24	2.81	2.60	A	
LED Current (Low Brightness)	IoutL	VIN=12V,Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	VIN=12V,Vadj=0V	1.08	1.12	1.2	A	
Working Frequency	Freq	VIN=12V,Vadj=0V	210	230	250	KHZ	
Brightness Control	Vadj	Connection of Voltage	0.2	-----	4.8	V	Vadj±5%
ON/OFF Control	Von	Normal Operation	2	-----	5	V	
	Voff	Normal Operation	0	-----	0.8	V	
Output Voltage	Vout	VIN=12V,Vadj=0V	26.7	27.2	27.6	V	
Efficiency	η	VIN=12V,Vadj=0V	89.9	90.3	90.9	%	

Connector Socket

Input Connector :J1(JST S8B-PH-SM3-TB or Compatible)

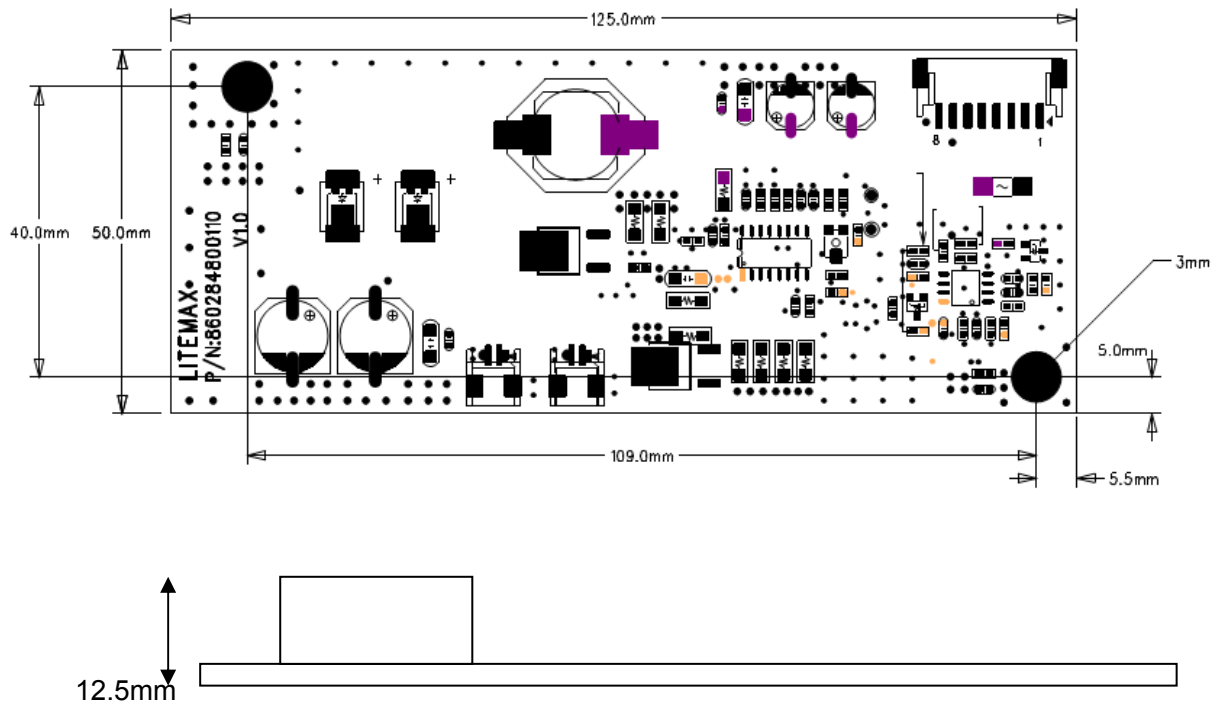
PIN No	Symbol	Description
1	Vin	DC+
2	Vin	DC+
3	Vin	DC+
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	Brightness	Brightness Control
8	Control	ON/OFF Control

Output Connector :J2,J3(JST S2B-EH or Compatible)

PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED Low Voltage (-)

Mechanical Characteristics

Dimension: 125 x 50 x 12.5mm

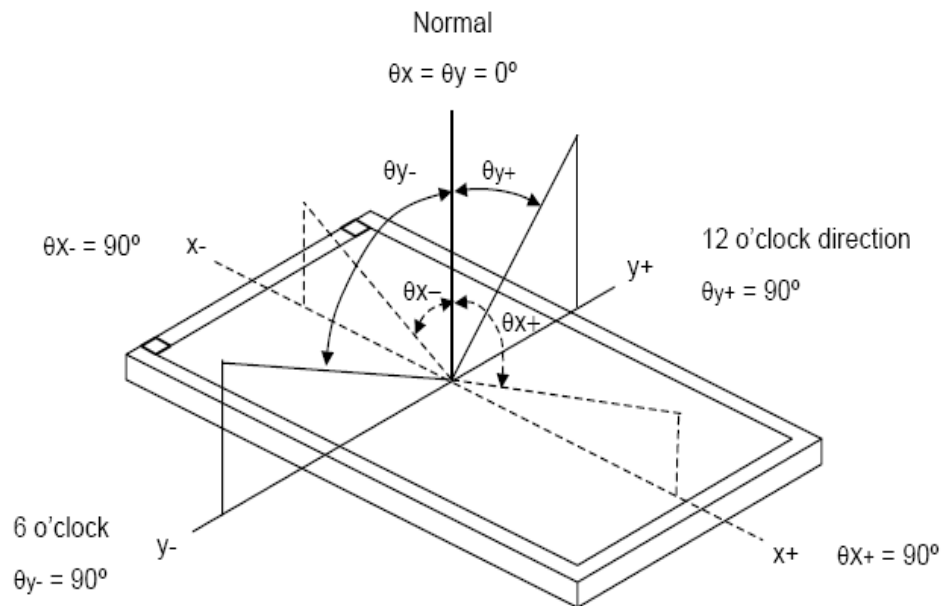


3.0 OPTICAL SPECIFICATION

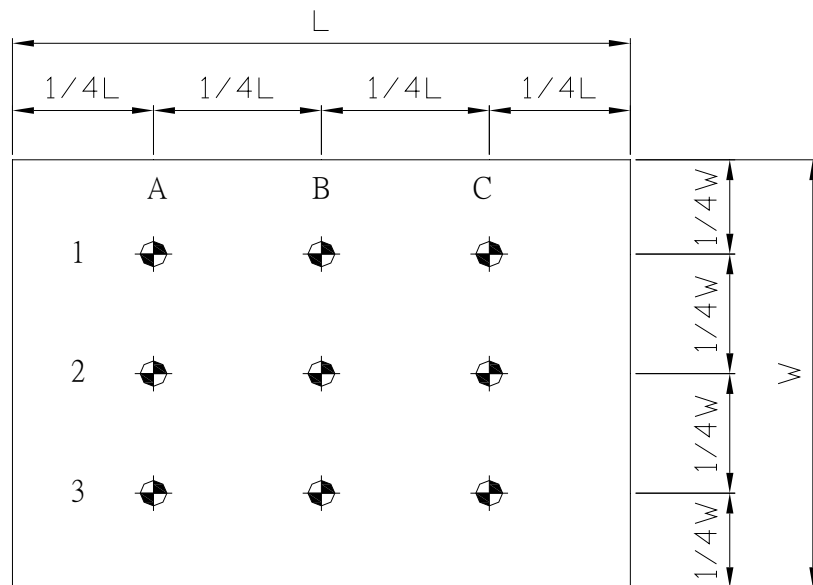
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CRn	-	1000	-	-	[1]
Luminance of White		L _{AVE}	800	1000	-	cd/m ²	[2]
Response Time		τ _{DRV}	-	14	-	ms	[3]
Uniform		Lu	75	80		%	
Chromaticity	Red	R _x	-	0.652 (± 0.03)	-	-	
		R _y	-	0.340 (± 0.03)	-	-	
	Green	G _x	-	0.329 (± 0.03)	-	-	
		G _y	-	0.611 (± 0.03)	-	-	
	Blue	B _x	-	0.144 (± 0.03)	-	-	
		B _y	-	0.072 (± 0.03)	-	-	
	White	W _x	-	0.318 (± 0.03)	-	-	
		W _y	-	0.368 (± 0.03)	-	-	
Viewing Angle	x axis, right(φ=0°)	θ _r	-	89	-	Degree	-
	x axis, left(φ=180°)	θ _l	-	89	-		
	y axis, up(φ=90°)	θ _u	-	89	-		
	y axis, down (φ=0°)	θ _d	-	89	-		

Test Mode :

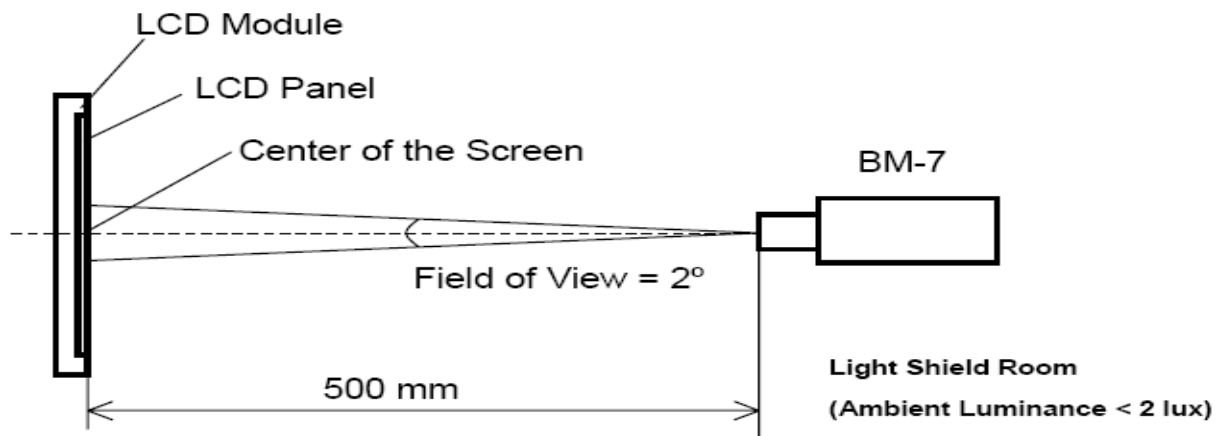
(1) Definition of Viewing Angle (θ_x , θ_y):



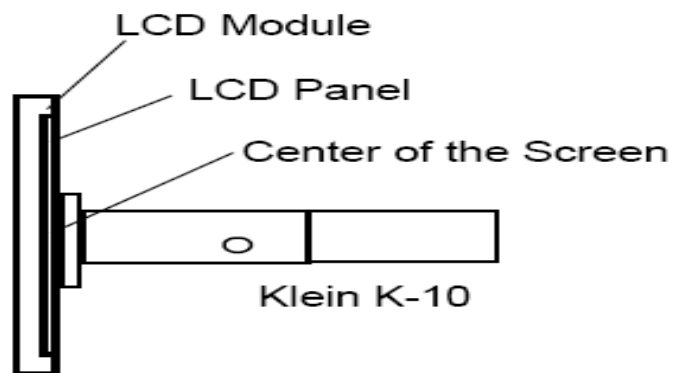
(2) Definition of Test Point :



(3) BM-7 Measurement Setup:



(4) Klein K-10 Measurement Setup:



4.0 AD6038GD SPECIFICATIONS & OSD Functions

We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has a display port and DVI-D input. Rev.1 is European RoHS compliant.

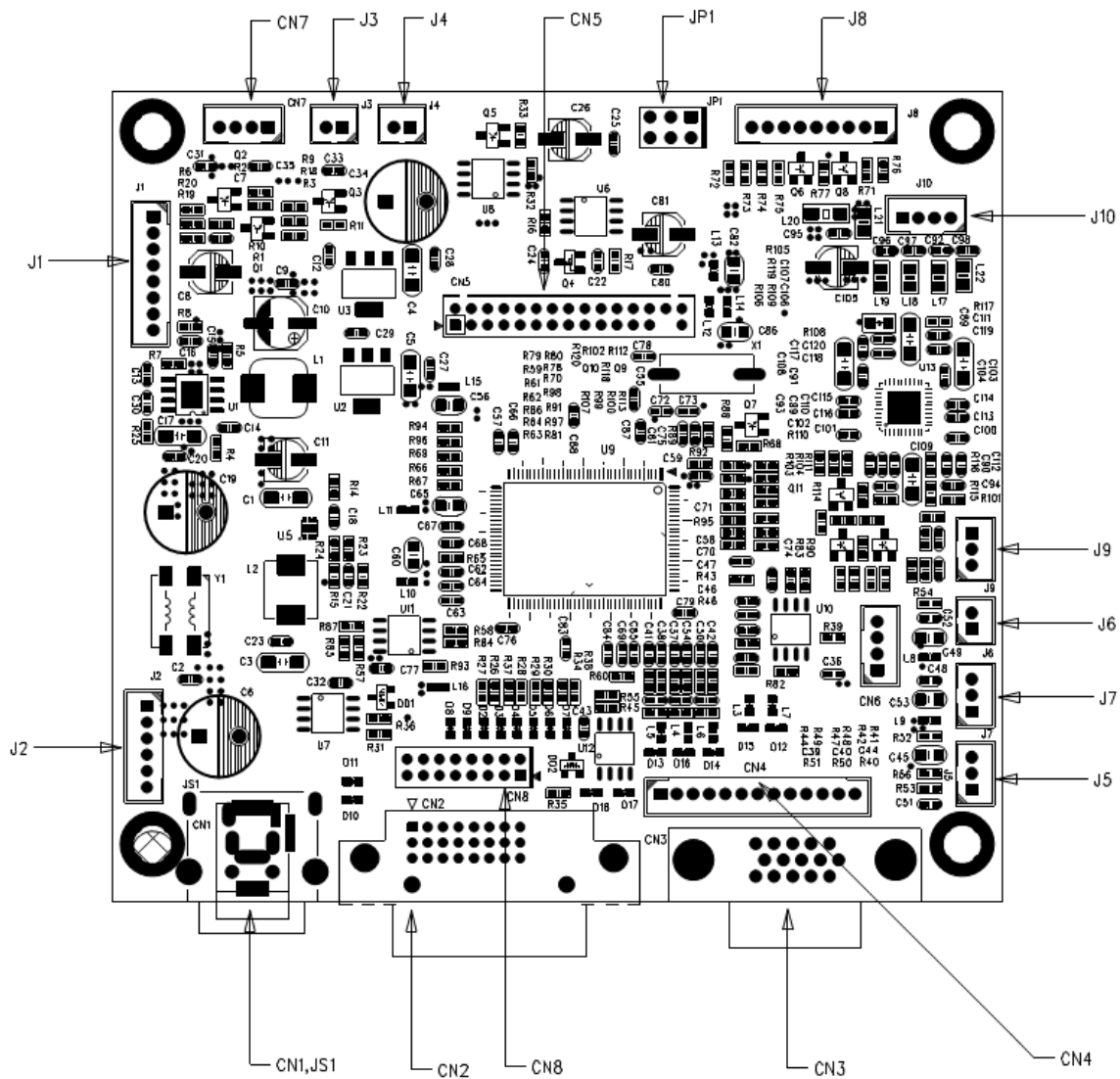
General Description

- **Max Resolution Up To WUXGA+**
- **Analog RGB Input up to 205MHz**
- **ULTRA-RELIABLE DVI-D INPUT**
- **Dual/single LVDS interface**
- **Support Panel DC5V or 12V,3.3V Output**
- **OSD Control**
- **Inverter Analog or PWM Dimming Control.**
- ***External RS232 control (optional)**
- **Input Power 12Vdc**
- ***Display port input. (Support display port 1.1a) (optional)**
- ***Audio in and 5Wx2 Audio Out(optional)**
- ***External V.R. brightness control (optional)**
- ***External light sensor brightness control (optional)**
- ***External IR control (optional)**
- **External Fan Control by Software**

AD6038 110mmX100mm



AD6038 Board Pin Define



CN5: Panel connector

Pin No.	Function	Pin No.	Function
1	RxO0-	16	RxE1+
2	RxO0+	17	RxE2-
3	RxO1-	18	RxE2+
4	RxO1+	19	RxEC-
5	RxO2-	20	RxEC+
6	RxO2+	21	RxE3-
7	RxOC-	22	RxE3+
8	RxOC+	23	GND
9	RxO3-	24	GND
10	RxO3+	25	GND
11	GND	26	GND
12	GND	27	NC
13	RxE0-	28	PANEL-VCC
14	RxE0+	29	PANEL-VCC
15	RxE1-	30	PANEL-VCC

CN2: DVI-D INPUT Connector

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S. Data2-	9	T.M.D.S. Data1-	17	T.M.D.S. Data0-
2	T.M.D.S. Data2+	10	T.M.D.S. Data1+	18	T.M.D.S. Data0+
3	T.M.D.S. Data2/4 Shield	11	T.M.D.S. Data1/3 Shield	19	T.M.D.S. Data0/5 Shield
4	T.M.D.S. Data4-	12	T.M.D.S. Data3-	20	T.M.D.S. Data5-
5	T.M.D.S. Data4+	13	T.M.D.S. Data3+	21	T.M.D.S. Data5+
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (for +5V)	23	T.M.D.S. Clock+
8	Vertical SYNC.	16	Hot Plug Detect	24	T.M.D.S. Clock-

CN8: DVI-D Connector (16pin 2.0mm)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	RX2-	7	DDC_SDA	13	GND
2	RX2+	8	DDC_SCL	14	GND
3	RX1-	9	GND	15	DVI HP
4	RX1+	10	GND	16	DVI_5V
5	RX0-	11	RXC-		
6	RX0+	12	RXC+		

CN3: Analog RGB Input connector (D-SUB 15Pin)

Pin	Symbol	Description	Pin No.	Symbol	Description
1	RED	Analog Red	9	+5V	+5VDDC
2	GREEN	Analog Green	10	SGND	Sync GND
3	BLUE	Analog Blue	11	NCD	Reserved
4	GND	Reserved	12	SDA	DDC Serial Data
5	GND	VGA_CAB	13	HSYNC	Horizontal Sync
6	RED_RTN	Red Return	14	VSNC	Vertical Sync
7	GREEN_RTN	Green Return	15	SCL	DDC Data Clock
8	BLUE_RTN	Blue Return			

CN4: Analog RGB Input connector (13pin connector)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	SDA	DDC Serial Data	8	GREEN	Analog Green
2	SCL	DDC Data Clock	9	GREEN_RTN	Green Return
3	GND	Reserved	10	BLUE	Analog Blue
4	+5V	+5VDDC	11	BLUE_RTN	Blue Return
5	GND	Reserved	12	VSNC	Vertical Sync
6	RED	Analog Red	13	HSYNC	Horizontal Sync
7	RED_RTN	Red Return			

CN1: Power Jack (12V)

Pin No.	Function	Pin No.	Function
1	12VDC	2	12VDC
3	GND	4	GND

J2: Power connector (12V) (4PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	12VDC	2	12VDC
3	12VDC	4	GND
5	GND	6	GND

CN7: Touch Power connector

Pin No.	Function	Pin No.	Function
1	5V	2	GND
3	12V	4	GND

J1: Inverter Connector(8PIN 2.0mm)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	ON/OFF	Backlight ON/OFF	5	GND	GND
2	BRIGHT	Dimming adjust	6	12VDC	Input 12VDC
3	GND	GND	7	12VDC	Input 12VDC
4	GND	GND	8	12VDC	Input 12VDC

J4, J3: Fan control (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	12V	2	GND

J8: Key Pad (9PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	POWER KEY	6	MENU KEY
2	GREEN LED	7	AUTO KEY
3	RED LED	8	GND
4	DOWN KEY	9	GND
5	UP KEY		

JP1: Panel Power

Pin No.	Function	Pin No.	Function
1-2	12VDC	5-6	3.3V
3-4	5V		

CN6: RS232 Connector

Pin No.	Function	Pin No.	Function
1	5v	2	UART TX
3	UART RX	4	GND

J9: Audio connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	GND	2	AUDIO-L
3	AUDIO-R		

J10: Speaker Connector (4PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	SPK_R+	2	SPK_R-
3	SPK_L-	4	SPK_L+

J7: VR connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3,3VDC	2	VR Out
3	GND		

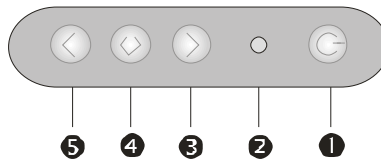
J6: Ambient (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3.3VDC	2	Sensor Out

J5: IR connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	IR	2	GND
3	IR VCC		

MEMBRANE CONTROL BUTTOM



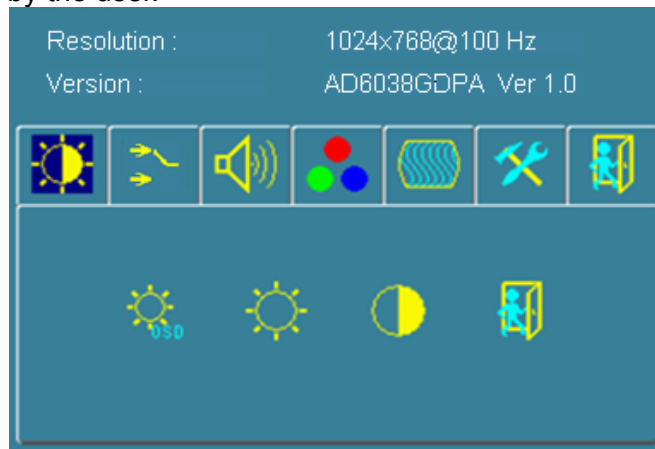
- ❶ **POWER SWITCH:** Pushing the power switch will turn the monitor on.
Pushing it again to turn the monitor off.
- ❷ **Power LED:** Power ON-Green / Power off-No.
- ❸ **Up Key >:** Increase item number or value of the selected item.
- ❹ **Menu Key:** Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu, and the change data don't save to memory.
- ❺ **Down Key <:** Decrease item number or item value when OSD is on.
When OSD is off, it is hot key for input switch between VGA, AV, and S-video.

Screen Adjustment Operation Procedure

1. **Entering the screen adjustment**
The setting switches are normally at stand-by. Push the **Menu Key** once to display the main menu of the screen adjustment. The adjustable items will be displayed in the main menu.
2. **Entering the settings**
Use the **Down Key <** and **Up Key >** buttons to select the desired setting icon and push the SELECT button to enter sub-menu.
3. **Change the settings**
After the sub-menu appears, use the **Down Key <** and **Up Key >** buttons to change the setting values.
4. **Save**
After finishing the adjustment, push the SELECT button to memorize the setting.
5. **Return & Exit the main menu**
Exit the screen adjustment; push the "MENU" button. When no operation is done around 30 sec (default OSD timeout), it goes back to the stand-by mode and no more switching is accepted except MENU to restart the setting.

OSD menu

By pressing the “menu” button, you will see the below picture. Across from timing you will see resolution, frequency, and V-frequency of the panel. Version shows the firmware control version. These cannot be altered by the user.



There are 7 sub menus within the OSD user interface:
Brightness, Signal Select, Sound, Color, Image, Tools, and Exit.

When you press the “menu” button, you enter the “Brightness” sub directory. In this directory, you will see 4 selections:



press “right” key, you can go into the **OSD Brightness**.
press “menu” onc, you can go into the **Potentiometer** or the **Ambient light sensor**.



Potentiometer:
press this lcom, adjust VR function.(**OPTION**)



Ambient light sensor:
press this lcon,must to accompany with Litemax ambient light sensor to auto dimming.(**OPTION**)



OSD Brightness :

Press the “menu” once, to adjust the brightness. Press “left” to dim down the brightness to “0”,
press “right” to increase the brightness to “100”



Contrast :

Press “menu” and “right” buttons to adjust the contrast from “0” to “100”. To adjust from “100” to “0”,
press “menu” and the “left” buttons.



Exit: back to the beginning menu.



VGA

Analog: RGB/VGA input

DVI

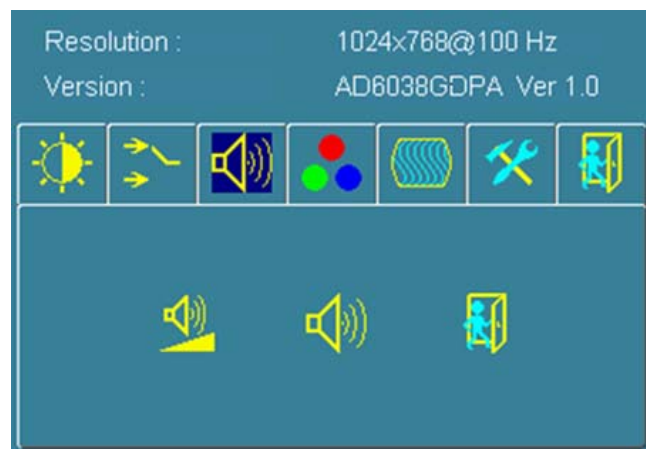
Digital: DVI input

DP

DP: DisplayPort input (Optional)

Exit

Exit: back to the beginning menu.



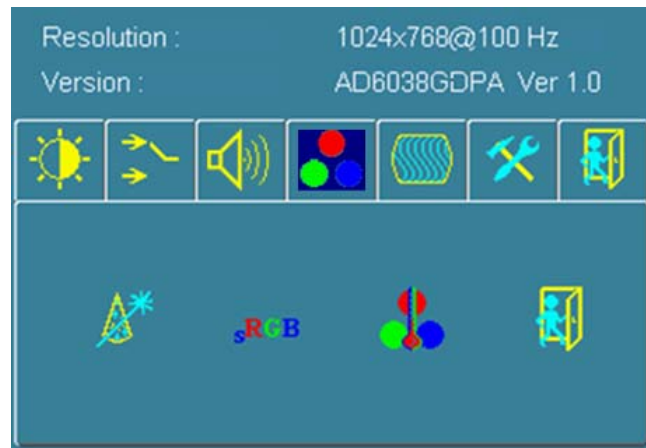
Audio Volume: Audio volume adjustment.



UnMute/Mute: You can mute the speaker by pressing this option.



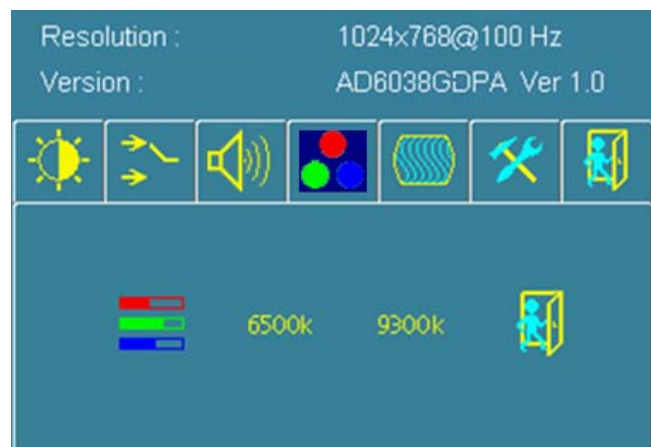
Exit: back to the beginning menu.



Auto Color : By navigating over to the “Auto Color” option, optimal color performance is invoked.



sRGB: Windows standard color setting



Color Temperature: You have 4 options in this selection



Color Temperature User Define: Default is 100 for “R”, “G”, and “B”.



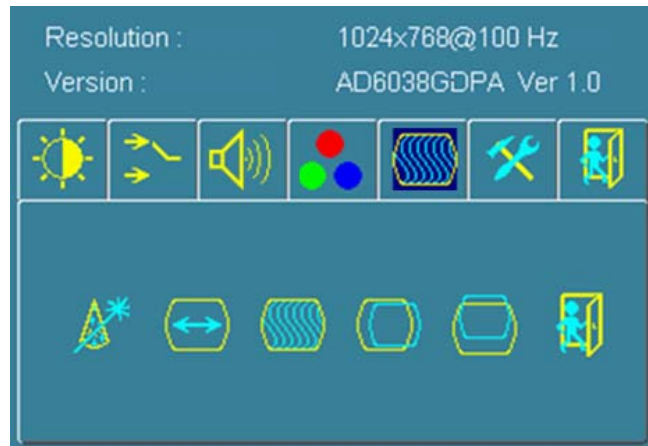
Color Tempature_6500K: Warm color scheme



Color Tempature_9300K: Cold color scheme



Exit: back to the beginning menu.



Auto Adjust:

Choose this option and the AD6038 will adjust to the optimal horizontal and vertical frequency.



Clock: If you are not satisfied with the Auto tune result, you can adjust manually by pressing “Clock”. Using this will make the image wider.



Phase: If “double images” appear around the characters, choose “Phase” to remove them..



HPos: You can shift the screen horizontally using this function.



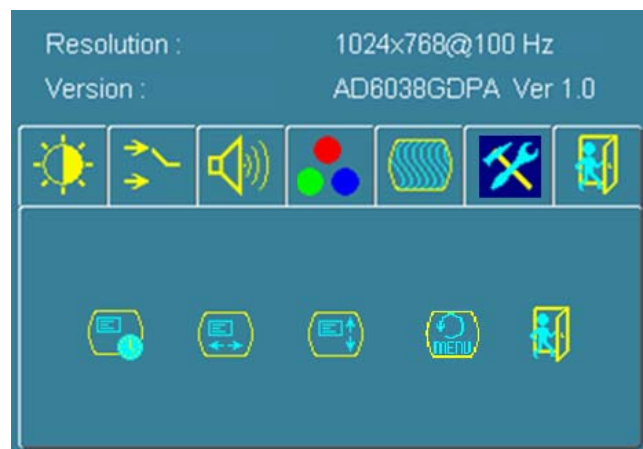
Vpos: You can shift the screen vertically using this function.



Exit: back to the beginning menu.



OSD Control: Selecting this option, brings you to 5 more options:



Osd_time: Select time for the OSD user interface to stay on screen, for 2 sec. to 16 sec. Default is 6 sec.



Osd_HPos: Moves the OSD user interface horizontally on screen.



Osd_VPos: Moves the OSD user interface vertically on screen.



Osd_Rotation: Rotates the OSD user interface Rotation($0^{\circ}/90^{\circ}/180^{\circ}/270^{\circ}$) on screen.



Exit: You can exit this sub menu back to the beginning



Factory_Reset: By pressing this, the screen will revert to factory settings, and the previous settings will be deleted.



Sharpness: Sharpen characters.



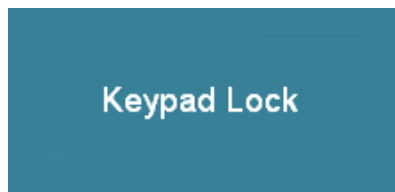
Dos_mode/Gxf_mode: For some old programs which use 640x400 and 720x400 (DOS Mode and graphics mode), This option needs to be selected manually.



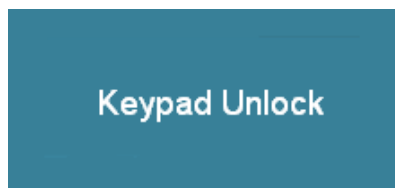
Exit: back to the normal screen

OSD Lock Function :

It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing “**Left <**” and “**right >**” and “Menu” buttons simultaneously. You will see the “lock” icon below on the center of the screen for 3 ~ 6 seconds. If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'



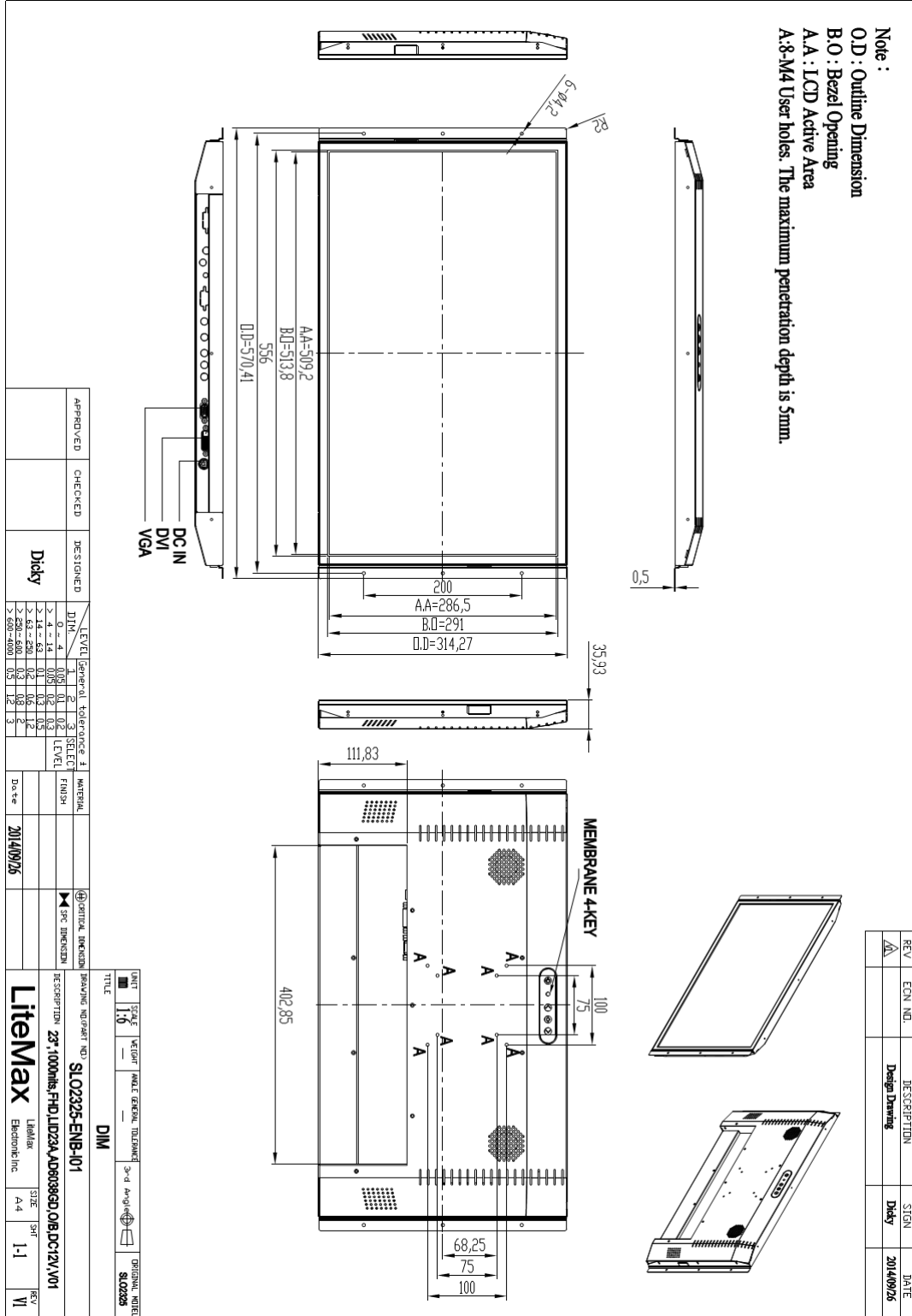
To release the OSD lock, press “**Left <**” and “**right >**” and “Menu”. The below icon will appear on the center of the screen for 3 ~ 6 seconds. Now all OSD keys are active again.



5.0 MECHANICAL DRAWING

SLO2325-E MECHANICAL SPECIFICATION

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	-	570.4	-	mm
	Vertical(V)	-	314.2	-	mm
	Depth(D)	-	35.9	-	mm
Weight (Module only)		-	4.2	-	kg



6.0 PRECAUTIONS

HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the lamp wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.